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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/673,352
Filing Date: September 30, 2003
Appellant(s): JOHNSON ET AL.

Aisha Ahmad
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 20 September 2007 appealing from the Office action mailed 22 March 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is substantially correct.

The rejection under 35 U.S.C. 112, 2nd paragraph has been withdrawn.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct.

The rejections under 35 U.S.C. 112, second paragraph have been withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 2005/0054969	Hoff et al	10 March 2005
US 2006/0206161	Nicolelis et al	14 September 2006
US 2004/0197883	Dzekunov et al	07 October 2004
US 2004/0241965	Merritt et al	02 December 2004

Hoff is directed to an electroporation device comprising a conducting portion and a stimulator array capable of generating spatially variant voltages.

Nicolelis is directed to an electroporation device comprising a microwire electrode array capable of generating spatially variant voltages.

Dzekunov is directed to an electroporation device comprising a flow chamber, a pump and tubing.

Merritt is directed to an electroporation device comprising a conducting portion that is connected to an electrode array using indium bumps.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Note: The 35 U.S.C. 112, 2nd paragraph rejection has been withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1) Claims 21, 24 and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The specification does not describe an embodiment in which only a single cathode or a single anode used. The entirety of the written description and drawings point only to examples in which a plurality of cathodes and a plurality of anodes are utilized. The term stimulator *array* in the specification and claims implies the use of many anodes and many cathodes arranged in a pattern. In particular, the limitation of "when said at least one anode comprises only a single anode, said at least one cathode comprises more than one cathode" does not have support in the specification (see page 10, lines 11-22).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2) Claim 21 is rejected under 35 U.S.C. 102(e) as being anticipated by Hoff (US 20050054969).

Hoff discloses a device for the electroporation of cultured cells. Paragraphs [0022] and [0049] state that a fluid flow chamber in the form of a microplunger (Figure 1:17) is used to deliver samples to a stimulator array formed within a conducting layer (Figure 1:12). The stimulator array is formed by electrodes (Figure 1:14 and Figure 1:15) that are capable of applying spatially variant voltages for electroporation. Paragraph [0020] states that the stimulator array comprises at least one anode and at least one cathode, and is structured for connection with a voltage source. This is additionally described in paragraphs [0018]-[0021], [0036]-[0038] and [0043]. Hoff specifically teaches that the electrode materials form anodes and cathodes that cause electroporation when a voltage is applied.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3) Claims 21 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoff (US 20050054969) in view of Nicolelis (US 20060206161) and/or Dzekunov (US 20040197883).

With respect to claim 21, Hoff discloses the apparatus as previously described above. As stated, it is believed that Hoff discloses a stimulator array in communication with the conducting electrode materials. The following rejection is provided to further prosecution if it is determined

that Hoff's base (12) and associated voltage and current source are not considered to be a stimulator array.

Nicolelis discloses a high-density multichannel microwire electrode array for measuring cell response to electrical signals. Paragraphs [0056]-[0077] state that microwire arrays are implanted upon a computer controlled printed circuit board capable of receiving information derived from each individual electrode.

Hoff and Nicolelis are analogous art because they are from the same field of endeavor regarding electrical manipulation devices for cells.

At the time of the invention, it would have been obvious to position the electrodes disclosed by Hoff upon a printed circuit board chip controllable by a computer. Nicolelis teaches that this arrangement is beneficial because it allows one to construct a high-density electrode array capable of interacting with a substantial number of cells simultaneously. Hoff already teaches that it is known to apply a time varying voltage of independent electrode clusters to induce electroporation. It would have been obvious to utilize a circuit board to accomplish this task because circuit board materials are inexpensive, easily machined, and capable of facilitating high densities of implanted electrodes.

With respect to claim 23, Hoff discloses the apparatus as previously described above. As stated above, it is understood that the microplungers (Figure 1:17) constitute fluid chambers that are in communication with the stimulator array and electrodes. However, if the microplungers cannot be considered fluid chambers in communication with the stimulator array and electrodes, then Hoff does not disclose that a fluid chamber operable to receive fluid.

Dzekunov discloses an electroporation device that comprises a fluid flow chamber through which cell samples are allowed to move. The chamber comprises electrodes that apply voltages sufficient to porate the cells as they flow through the chamber. The chamber includes inflow and outflow ports, valves, tubing, and a pump. This is described in Figure 12 and paragraphs [0191]-[0193] and [0240]-[0242].

Hoff and Dzekunov are analogous art because they are from the same field of endeavor regarding electroporation apparatuses.

At the time of the invention, it would have been obvious to ensure that the electroporation system proposed by Hoff is provided with a fluid flow chamber that comprises access ports, valves, and a pump. More specifically, it would have been apparent to form a flow cell chamber around the stimulator array and the conduction portion in order to form a reaction chamber within which cells and tissues can undergo electroporation. Dzekunov teaches that flow cells are beneficial because they can be used to automatically porate and treat a large number of cells in a short amount of time. The use of an automatic flow cell system is desirable because it can be easily and inexpensively operated when compared to other electroporation systems.

With respect to claims 24-27, Hoff and Nicolelis and/or Dzekunov disclose the apparatus set forth in claim 21 as set forth in the 35 U.S.C. 103 rejections above. In addition, Hoff indicates in the Figures that a plurality of anodes and cathodes are arranged in alternating fashion. Each cathode is surrounded by many of anodes. Generally, the duplication and rearrangement of parts is not sufficient to overcome the prior art. See MPEP 2144.04. In this

case, varying the number and positioning of the anodes and cathodes is not considered to be a patentable difference.

4) Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoff (US 20050054969) in view of Nicolelis (US 20060206161) and/or Dzekunov (US 20040197883) as applied to claim 21, and further in view of Merritt (US 20040241965).

Hoff and Nicolelis and/or Dzekunov disclose the apparatus set forth in claim 21 as set forth in the 35 U.S.C. 103 rejection above, however do not expressly disclose that the electrode material comprises glass hybridized to the simulator array with indium bumps.

Merritt discloses a high aspect ratio microelectrode array useful in the delivery and detection of electrical signals at discrete, spatially resolved locations. Paragraph [0037] indicates that it is known in the art to utilize indium bumps to make electrical connections between two arrays of electrical contacts.

Hoff, Nicolelis, Dzekunov and Merritt are analogous art because they are from the same field of endeavor regarding electrical manipulation devices.

At the time of the invention, it would have been obvious to connect the microwire glass electrodes to the simulator array using the well known process of indium bump bonding. Merritt teaches in paragraph [0037] that wire electrodes easily can be pushed into indium in order to create an electrical connection between an array of electronic unit cells and an array of microelectrodes.

(10) Response to Argument

I. Claims 21, 24 and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Appellant's principle arguments are

(a) Lines 6-14 of paragraph [0031] of the substitute specification filed January 18, 2007 clearly state many embodiments that include a single electrode of one type and a plurality of electrodes of another type.

In response to Appellant's arguments, please consider the following comments.

The following paragraphs discuss the different electrode geometries described in Figure 5. Figures 5A-5D each show unit cell arrangements that are repeated to form a pattern. This pattern of electrodes results in an array of electrodes.

Paragraph [0031] is a description of Figures 5A-5D. Figure 5A is an embodiment in which a plurality of cathode (501) and anode pairs (502) is used to provide multiple electroporation sites. Since a plurality of cathodes and anodes are used, Figure 5A does not represent an embodiment in which a single electrode of one type is used in combination with a plurality of electrodes of another type.

Figure 5B is an embodiment in which one cathode (503) is used in combination with eight anodes (504). This would seem to give support for part of the scope of the claimed limitation "wherein said at least one cathode comprises a single cathode, said at least one anode comprises more than one anode." However, after considering the specification as a whole, this "one cathode, eight anodes" template is meant to be repeated to form an electrode array. While one unit of the array may contain a single cathode and multiple anodes, the array as a whole will

contain multiple cathodes and multiple anodes. Therefore, Figure 5B is similar to Figure 5A in that it does not represent an embodiment in which a single electrode of one type is used in combination with a plurality of electrodes of another type.

Figure 5C is an embodiment in which a plurality of anodes and a plurality of cathodes are arranged in rows.

Figure 5D is an embodiment in which a single anode (508) is used in combination with a single cathode (507). This arrangement does not satisfy the limitations presented in claim 21 which state that "when said anode comprises only a single anode, said at least one cathode comprises more than one cathode."

II. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention.

In response to Appellant's remarks, these rejections under 35 U.S.C. 112 second paragraph have been withdrawn.

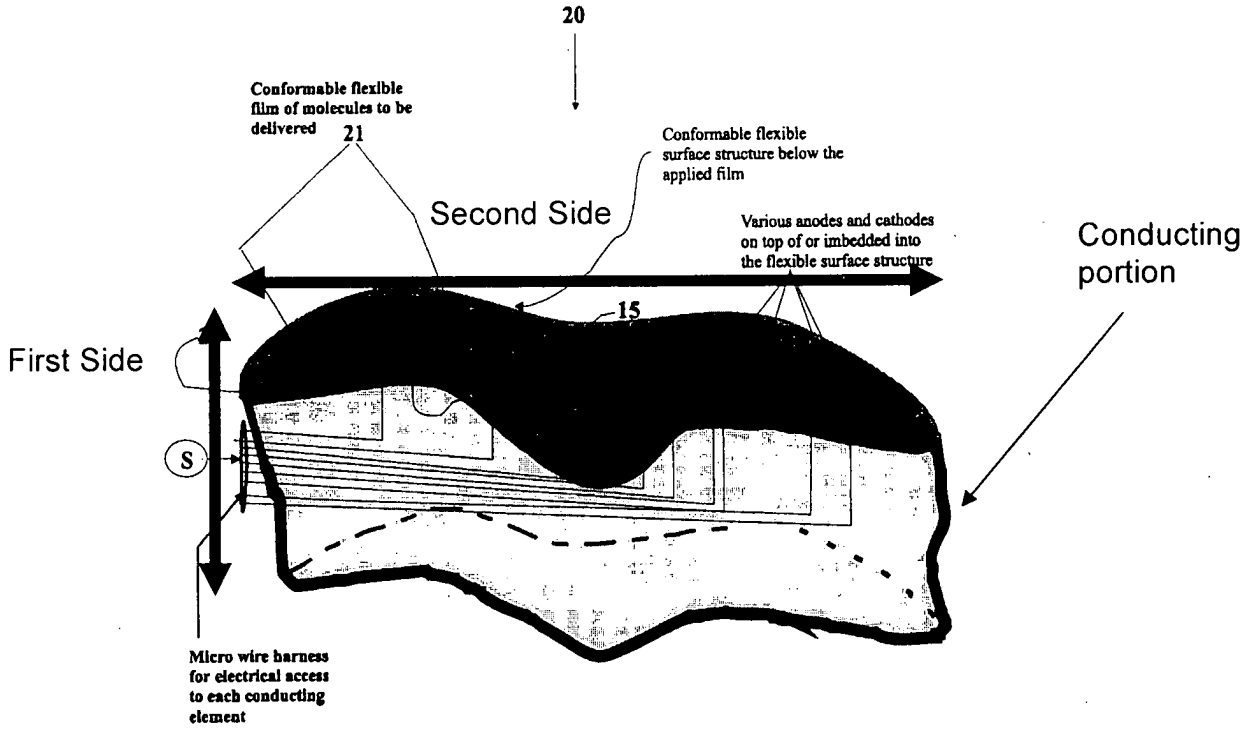
III. Claim 21 is rejected under 35 U.S.C. 102(e) as being anticipated by Hoff (US 20050054969).

Appellant's principle arguments are

(a) Hoff fails to disclose a conducting portion having a second side being disposed to receive a layer of a plurality of objects disposed therein through electroporation. The Office Action fails to point out a disclosure of a stimulator array in Hoff.

In response to Appellant's arguments, please consider the following comments.

As described in the rejection above, Hoff discloses a conducting portion (Figure 1:12) within which an array of electrodes (Figure 1:15) are formed. The electrodes represent a stimulator array comprising at least one anode and at least one cathode. The conducting portion comprises a first side in electrical contact with the at least one anode and the at least one cathode. The conducting portion comprises a second side disposed to receive cells to be porated. For clarity, this arrangement is represented in the Figure reproduced below.



Anodes and cathodes are positioned on top of the second side of the conducting portion, and are used to porate cells positioned on the second side. The anodes and cathodes are in

electrical contact with the first side of the conducting portion via micro wires that connect to a power supply.

(b) In the event that one of the microplungers 18 of Hoff is considered a fluid chamber as recited in claim 21, when the fluid is in the microplunger 18, an unidentified stimulator array would be unable to enable the fluid to pass through membranes.

In response to Appellant's arguments, please consider the following comments.

The apparatus of Hoff is capable of delivering a fluid from a microplunger to the conducting portion upon which a stimulator array is positioned. As fluid is moved from the microplunger, it flows to the stimulator array and is enabled to pass through the membranes of objects (cells) that are also positioned on the stimulator array. This is a continuous process. The apparatus of Hoff is fully capable of beginning the electroporation process as fluid is still moving from the microplunger to the stimulator array.

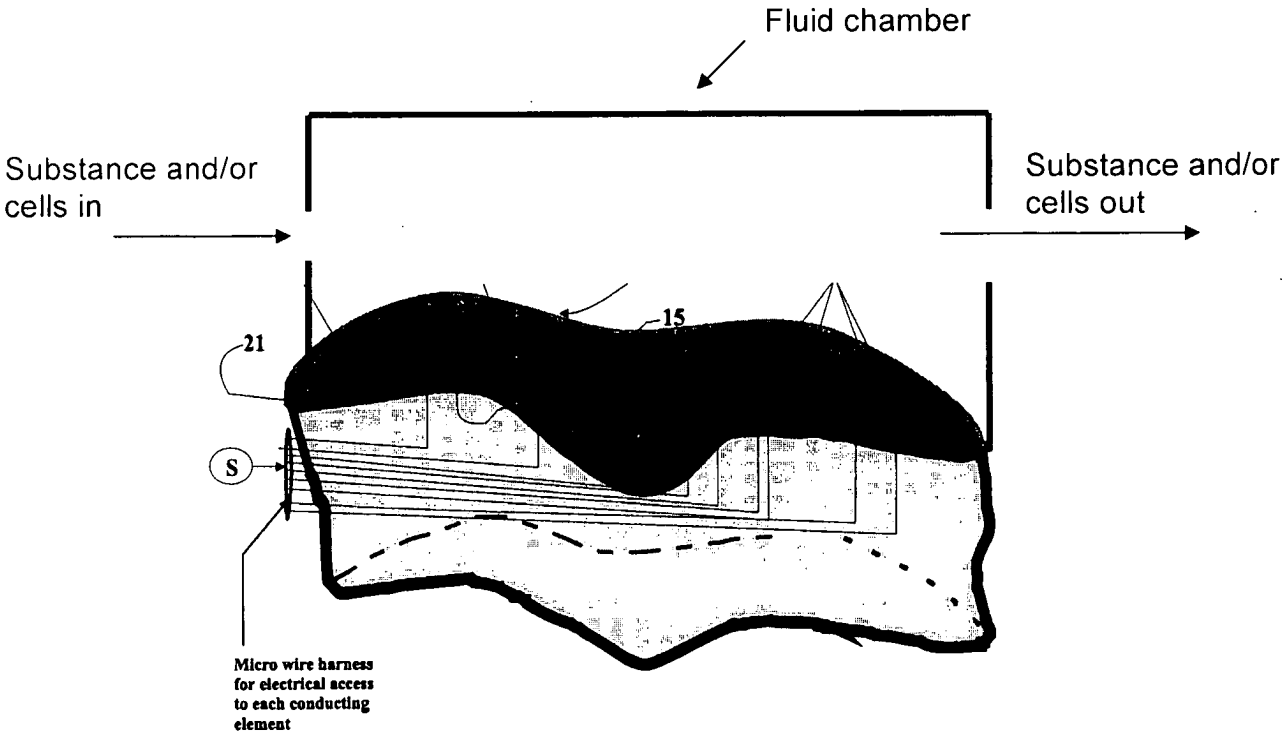
IV. Claims 21 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoff (US 20050054969) in view of Nicolelis (US 20060206161) and/or Dzekunov (US 20040197883).

Appellant's principle arguments are

(a) Nicolelis and Dzekunov fail to disclose that when the second side of the conducting portion has a layer of the plurality of objects thereon, the stimulator array is operable to generate spatially variant voltages to the conducting portion to enable the substance to pass through membranes of a spatially variant portion of the plurality of objects via electroporation.

In response to Appellant's arguments, please consider the following comments.

The Dzekunov is relied upon precisely for teachings that indicate that it would be obvious to modify the Hoff reference by creating a fluid chamber capable of holding a volume of solution containing a substance over the stimulator array. In this arrangement, one would be able to move a fluid from the microplungers to a fluid chamber positioned in communication with the second side of the conducting portion. As a result, one would be able to use the stimulator array to carry out electroporation and thereby introduce a substance located within the fluid inside of cells positioned on the second side of the conducting portion. Dzekunov teaches that flow chambers are beneficial because they can be used to automatically porate and treat a large number of cells in a short amount of time. The use of an automatic flow cell system is desirable because it can be easily and inexpensively operated when compared to other electroporation systems. The Figure below represents the invention of Hoff as modified by Dzekunov.



Since Dzekunov discloses that it is well known in the art to utilize a fluid chamber surrounding a stimulator array and a conducting portion, Nicolelis is merely relied upon for teachings regarding the use of a microwire electrode array capable of generating spatially variant voltages. Applicant does not challenge the assertion that Hoff and Nicolelis each disclose the generation of spatially variant voltages.

V. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoff (US 20050054969) in view of Nicolelis (US 20060206161) and/or Dzekunov (US 20040197883) and further in view of Merritt (US 20040241965).

Appellant's principle arguments are

(a) The combination of Hoff with Nicolelis and/or Dzekunov does not disclose a conducting portion having a second side being disposed to receive a layer of a plurality of objects that are to have a substance disposed therein through electroporation. The Merritt reference is drawn to the use of indium bumps, and therefore fails to disclose the shortcomings of Hoff.

In response to Appellant's arguments, please consider the following comments.

As described in the 35 U.S.C. 102 rejection above, Hoff clearly does disclose a conducting portion having a second side being disposed to receive a layer of a plurality of objects that are to have a substance disposed therein through electroporation. This is further discussed above in the response to the third ground of rejection arguments.

Additionally, the response to the fourth ground of rejection above suggests that the combination of Hoff with Dzekunov results in a separate embodiment that also reads on Applicant's claimed limitations.

The Merritt reference is merely cited as evidence that it is known in the art to utilize indium bumps when making electrical connections.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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